

Operating Experience Weekly Summary 97-37

September 5 through September 11, 1997

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EVENTS

1. PLENUM DELUGE SYSTEM ACTIVATED DURING TESTING

On August 29, 1997, at Rocky Flats Environmental Technology Site, alarm technicians inadvertently actuated a plenum deluge system while performing an annual battery load-test on a fire panel. Fire department personnel estimated that the deluge system released 2,000 gallons of water into the plenum and approximately 500 gallons of water leaked from the plenum into adjacent contamination areas. Radiological Operations personnel performed surveys and took air samples throughout the building. They determined that no contamination was spread as a result of the system actuation. Investigators determined that the alarm technicians used a generic procedure, supplemented by an uncontrolled list of the associated systems connected to the tested alarm points. They also determined that the technicians failed to isolate the plenum deluge system because it was not identified on the list. Failure to incorporate necessary information into procedures could have led to personnel contamination, equipment damage, and the spread of contamination. (ORPS Report RFO-KHLL-NONPUOPS1-1997-0009)

Investigators determined that the technicians considered the battery load-test to be a routine task. Therefore, they did not conduct a pre-job brief, which would have allowed the operations manager to review the job to determine any potential effects to the facility. Investigators determined that the technicians actuated an alarm on the fire panel in accordance with their test procedure. This alarm point also actuated the deluge system. Because they did not isolate the alarm before the test, the deluge system received an actuation signal. Investigators also determined that the technicians used an uncontrolled list to determine what systems required isolation during alarm testing. Facility personnel continue to clean up and properly dispose of the water released from the deluge system.

The facility manager held a meeting to review this event and determine corrective actions. He directed facility personnel to complete the following corrective actions by October 1, 1997.

- Add accurate and complete system documentation to the procedure.
- Add hold points to the procedure that require fire department personnel to verify alarm interfaces as the test is being performed.
- Perform pre-job briefs for all fire system alarm testing.
- Generate work orders for identification, fabrication, and installation of user aids on the alarm panels to help workers determine if additional systems are connected to the alarm points.

NFS has reported on inadequate procedures in several Weekly Summaries.

- Weekly Summary 97-27 reported that stationary operating engineers at Rocky Flats Environmental Technology Site failed to reactivate data-logger alarm points after a monthly emergency generator load test. Investigators determined there were no logs, policies, or procedures for deactivating the alarms. (RFO-KHLL-SOLIDWST-1997-0027)
- Weekly Summary 96-48 reported that an operator at the West Valley Site performing a valve line-up on an instrument air dryer closed a bypass valve before opening the supply air valve and caused the main plant process ventilation to shut down. The operator used the correct procedure; however, the

procedure did not give a specific, sequenced valve line-up. Inadequate procedures resulted in the loss of main plant ventilation system. (ORPS Report OH-WV-WVNS-1996-0012)

- Weekly Summary 96-24 reported that a crane operator at Savannah River H-Canyon failed to have a flexible jumper change independently verified, as required, because of an inadequate procedure. Also, crane supervisors did not verify changes to the equipment alignment status board in the control room, but signed shift turn-over checklists indicating they had. An inadequate procedure and improper conduct of operations created the potential for a radiological release to the environment through H-Canyon return systems for circulated cooling water. (ORPS Report SR--WSRC-HCAN-1996-0016)

OEAF engineers searched the ORPS database for reports about alarm testing and procedure violations or inadequate procedures and found 254 occurrences. Figure 1-1 shows the distribution of root causes reported by facility managers for these events. Personnel error represented 36 percent of the root causes; management problems accounted for 34 percent. As shown in the figure, procedure not used or used incorrectly accounted for 45 percent of the personnel errors, with an additional 42 percent attributed to inattention to detail. Inadequate administrative control accounted for 32 percent of the management problems, with an additional 29 percent attributed to policy not adequately defined, disseminated, or enforced.

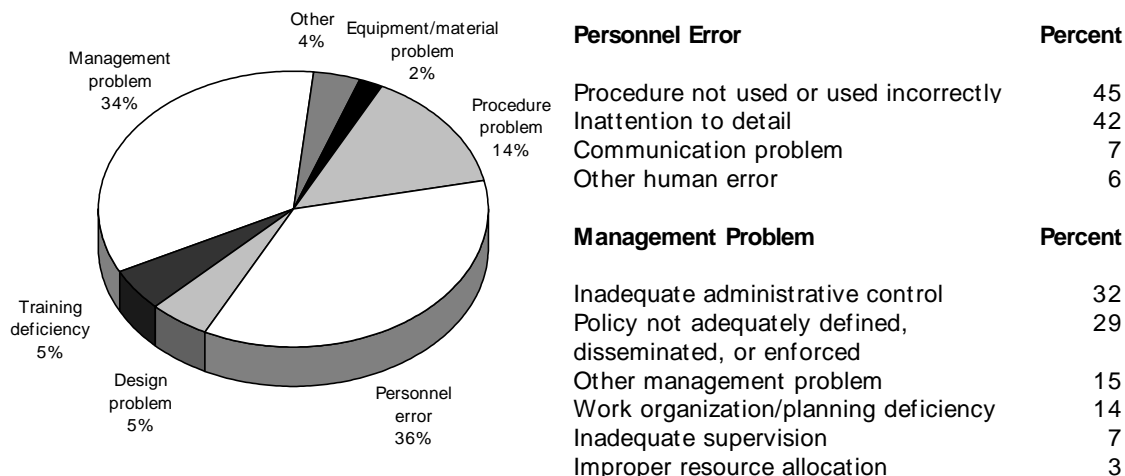


Figure 1-1. Distribution of Root Causes for Alarm Testing and Violations/Inadequate Procedures¹

This event illustrates the consequences of using uncontrolled lists or procedure attachments. Incorporating alarm interface information as a precaution or warning directly before the step in the procedure that it applies to will provide a high degree of reliability and reduce the risk of human error. This event could have been prevented if the systems associated with the alarm panel were identified in the procedure and the attachment controlled.

This event also illustrates the importance of ensuring that operations managers and operators are informed of operations that may affect facility performance. A pre-job brief would have required

¹ OEAF engineers searched the ORPS database using the graphical users interface for reports with nature of occurrence code "01F" (violation/inadequate procedures) AND narrative "alarm@ AND test" and found 254 reports. Based on a random sampling of 20 events, OEAF engineers determined that each slice is accurate within ± 1.5 percent.

the operations manager to review and approve the job. If the operations manager had been notified, he might have identified the problem before the job started.

Facility personnel who write procedures should review the following Order and standards to ensure that procedures include the appropriate level of detail for successful test performances and that administrative controls are in place to notify operations personnel of scheduled work activities.

- DOE O 5480.19, *Conduct of Operations Requirements for DOE Facilities*, section XVI, states that procedures should provide appropriate direction to ensure that the facility is operated within its design basis and should be used effectively to support safe operations of the facility. The Order also states that procedures should be written so that they can be easily used without making mistakes and that component or system shut-down and restoration requirements for test activities should be specific and controlled by procedures. Section II of the Order requires prompt operator notification of all facility status changes to ensure that the proper attention is given to changing conditions.
- DOE-STD-1029-92, *Writer's Guide for Technical Procedures*, provides guidance for the preparation of procedures used at DOE facilities. This standard states that tasks associated with testing equipment and systems must be defined in the procedure to ensure safe and efficient operation within the appropriate margins of safety. Section 4.1 discusses the basic elements of writing action steps; section 4.10 discusses how to include warnings, cautions, and notes in procedures.
- DOE-STD-1039-93, *Guide to Good Practices for Control of Equipment and System Status*, criteria 7, states that for equipment important to safety, all activities that affect operations or that change control indications or alarms should be properly analyzed, documented, and authorized.

KEYWORDS: fire alarm, plenum, procedures, testing, flooding

FUNCTIONAL AREAS: Procedures, Fire Protection

2. STATE ISSUES NOTICE OF VIOLATION FOR 135 APPARENT VIOLATIONS AT IDAHO

On August 25, 1997, the State of Idaho, Division of Environmental Quality, sent a Notice of Violation to the DOE Idaho Operations office for 135 apparent violations of the Hazardous Waste Management Act. State inspectors discovered the violations during an inspection performed at Idaho National Engineering Environmental Laboratory in November 1996. The State proposed penalties totaling \$892,725. The Notice also included apparent violations that were not associated with the inspection, some of which dated back to 1992. Deficiencies associated with environmental waste programs can result in safety and health hazards to workers, fires and explosions, reactivity hazards, and corrosion of monitoring and process equipment. (ORPS Report ID--LITC-LITCOSITEW-1997-0002)

A previous Notice of Violation sent to the Idaho Operations Office in March 1996 included 61 similar violations. Idaho National Engineering Environmental Laboratory personnel discovered the apparent violations while implementing corrective actions to address the previous Notice of Violation and reported them to the State. The State included these apparent violations in the latest Notice of Violation. A DOE hazardous waste representative stated that a number of the apparent violations identified in the latest Notice are similar to the March 1996 violations, including failure to determine solid waste hazards; storage of hazardous materials for more than 90 days without a permit; and failure to maintain records of inspections. The State has 2 years from the date the violations were discovered to take enforcement actions. The Notice identified violations in the following areas (paraphrased from the Notice without intent to determine fault).

- Seventy-seven (77) violations, totaling \$540,600 in penalties, for operations at the Test Reactor Area acid and caustic tanks. These violations related to mishandling mercury-contaminated sulfuric acid and sodium hydroxide mixtures. Test Reactor Area personnel transferred nearly two and one-half million pounds of the mixtures from the tanks to an unlined chemical leaching pond for disposal.
- Twenty-six (26) violations, totaling \$167,575 in penalties, for operations at the Mercury Retort Area. These violations related to inadequate operational and process controls for mercury-contaminated hazardous wastes.
- Twenty-one (21) violations, totaling \$102,345 in penalties, for inadequate hazardous waste determinations at various locations. These violations related to incorrect hazardous waste determinations and the failure to perform hazardous waste determinations.
- Three (3) violations, totaling \$30,000 in penalties, for storing hazardous waste longer than 90 days without a permit. These violations related to storing wastes that exhibited the toxicity characteristics for chromium, mercury, and waste-constituent groundwater samples for more than 90 days without a permit.
- The remaining violations, totaling \$52,205 in penalties, were for disposal of hazardous waste, various environmental releases, and the failure to adequately characterize waste.

DOE requested a compliance conference with the State to explain the apparent violations and discuss entry into a Consent Order. The Consent Order will include payment of agreed-upon penalties and implementation of necessary corrective actions and will ensure future compliance. The first compliance conference is currently scheduled for September 29, 1997.

OEAF engineers performed a cross-category review of the apparent violations and determined that 85 percent of them occurred in the following four categories.

Category	Percent
Failure to report releases	33
Disposal of hazardous waste without permit, variance, or exemption	27
Inadequate hazardous waste determinations	18
Inadequate operations and process controls	7

Personnel responsible for hazardous wastes should review the Hazardous Waste Management Act and ensure compliance with its requirements. Facility compliance with the Act is required by DOE O 5480.4, *Environmental Protection, Safety, and Health Protection Standards*. The Hazardous Waste Management Act is mandated by 40 CFR, *Rules and Standards for Hazardous Waste*, parts 260 through 265, 268, and 270. Failure to comply with state and local regulations may result in citations, violations, and fines. Managers at DOE facilities who are responsible for operation, processing, or storage of hazardous wastes should verify that procedures adequately address these requirements. Managers at DOE facilities should also ensure that work packages for transferring hazardous wastes address these requirements and that hazardous waste determinations are performed when required. Following is a summary of some of the 40 CFR requirements that were cited in the Notice of Violation.

- 40 CFR 262.11 states that hazardous waste determinations must be completed for facilities that generate solid waste hazards.
- 40 CFR 264.174 states that, at least weekly, the owner or operator must inspect areas where containers are stored, looking for leaking containers and for deterioration of containers and the containment system caused by corrosion or other factors.
- 40 CFR 264.31 states that facilities must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.
- 40 CFR 264.55 states that there must be at least one employee, either on the facility premises or on call, with the responsibility for coordinating all emergency response measures. The coordinator must be thoroughly familiar with (1) all aspects of the contingency plan, (2) all operations and activities, (3) locations and characteristics of waste handled, (4) locations of all records, and (5) the facility layout. Also, the coordinator must have the authority to commit the resources needed to carry out the contingency plan.

KEYWORDS: environment, inspection, violations

FUNCTIONAL AREAS: Environmental Protection, Operations, Licensing/Compliance

3. **PORTABLE VENTILATION UNIT OPERATED WITHOUT HIGH-EFFICIENCY PARTICULATE AIR FILTER**

On September 2, 1997, at the Savannah River Site F-Tank farm, operators used a portable ventilation unit without a required High-Efficiency Particulate Air (HEPA) Filter. The HEPA filter prevents a release of radioactive contamination from the tank to the environment. Operators initially installed the portable ventilation unit, which consisted of a blower, roughing filter, and HEPA filter, on a tank riser to provide temporary tank ventilation in support of tank-closure activities. Investigators determined that someone removed the HEPA filter from the blower suction after the unit was installed, then reconnected the unit to the tank riser. When workers resumed the tank-closure work, they operated the portable ventilation unit without the HEPA filter. No personnel were contaminated, but the blower and roughing filter were. This event is significant because the temporary installation of the ventilation system was not administratively controlled. The removal of the HEPA filter could have contaminated workers and the environment. (ORPS Report SR--WSRC-FTANK-1997-0013)

The High Level Waste Operations supervisor relocated all workers away from the affected area. He placed a hold on the tank-closure work activities, which included removal and disposal of internal tank equipment, and operators secured the tank-riser ventilation system. Radiological Controls Operations personnel surveyed the area and workers and detected no contamination.

The facility manager conducted a critique of the event. Critique members have not determined who removed the HEPA filter or why it was removed. They have not located the filter, which is housed in a 2-foot-square enclosure. Corrective actions included (1) installing another filter, (2) classifying the portable ventilation unit as a temporary modification, (3) tagging the unit to prevent removal, and (4) educating personnel that only operations personnel are allowed to operate the unit.

NFS reported a similar event in Weekly Summary 97-21 when construction workers at the F-Tank farm used a portable ventilation unit that was dedicated for emergency ventilation of tanks per the facility operational safety requirements. The construction workers took the portable ventilation unit to provide additional ventilation for a tank they were filling with grout. Investigators determined the direct and root causes of this event were a management problem (inadequate administrative control). Corrective actions included (1) designating a storage location, (2) placing administrative controls on the storage location, (3) posting visible signs indicating emergency use only, and (4) changing the portable ventilation procedure to identify positive controls. (ORPS Report SR--WSRC-FTANK-1997-0006)

This event illustrates the importance of maintaining adequate control over equipment installed for temporary use. When operators isolated the tank to prepare for tank closure, its normal ventilation path was no longer available. Operators installed a portable ventilation unit to provide temporary ventilation capability to protect workers and the environment from potential contamination. This modification to the tank should have been classified as a temporary modification to ensure that administrative controls, such as tagging or labeling, controlled the status of the equipment.

DOE O 5480.19, *Conduct of Operations Requirements for DOE Facilities*, chapter VIII, "Control of Equipment and System Status," states that DOE facilities are required to establish administrative control programs to handle configuration changes resulting from maintenance, modifications, and testing activities. Administrative controls should be established for installation of temporary modifications such as installed filters. DOE-STD-1039-93, *Guide to Good Practices for Control of*

Equipment and System Status, states that special administrative controls are required when equipment is operated with temporary modifications. NFS issued DOE/EH-0345, Safety Notice 93-02, "Control of Temporary Modifications," in September 1993. The notice provides recommendations for increasing the control of the temporary modification process. Safety Notice 93-02 can be obtained by contacting the ES&H Information Center, (301) 903-0449, or by writing to ES&H Information Center, U.S. Department of Energy, EH-72/Suite 100, CXXI/3, Germantown, MD 20874. Safety Notices are also available on the Operating Experience Analysis and Feedback Home Page at http://tis.eh.doe.gov:80/web/oeaf/lessons_learned/ons/ons.html.

KEYWORDS: equipment, modification control, ventilation, tank, contamination

FUNCTIONAL AREAS: Operations, Modifications

4. SUSPENDED LOAD DROPS WHEN CORRODED RIGGING BREAKS

On August 29, 1997, at the Hanford N-Reactor, a 460-pound submersible pump dropped when a 3/8-inch-diameter, carbon-steel choker broke during a lift. The pump was suspended 1 foot above the water at the N-Basin south load-out pit when the rigging broke. The pump drifted down and settled on the bottom, 20 feet below the surface. Investigators believe the choker, a short wire-rope sling used to form a slip noose around the object to be lifted, was weakened by corrosion from chemicals added to maintain basin-water pH. The choker had been submerged in the basin for over a year, and the riggers did not inspect it before the lift. Water did not splash on any of the workers, and no equipment was damaged. Failure to properly inspect rigging can result in equipment damage, personnel injury, or fatality from a dropped load. (ORPS Report RL--BHI-NREACTOR-1997-0016)

The pump dropped while workers were raising it out of the load-out pit with a 60-ton crane. They planned to use the crane to remove the pump from the basin, apply a fixative, and place the pump in a disposal box. Workers had successfully removed two other submersible pumps from the N-Basin without incident earlier in the shift. These pumps were used for previous N-Basin water-filtration operations and were being removed for disposal as low dose rate hardware (less than 1 rem on contact). The N-Reactor is undergoing deactivation for transfer to a surveillance and maintenance mode.

The facility manager requested an investigation of the incident. Investigators determined that the failed choker had been submerged with the pump since March 1996 and was past due for its annual inspection. Investigators determined that the carbon-steel chokers used to lift the other pumps also exhibited signs of corrosion. They resolved that any future removal of equipment/rigging that has been underwater for a lengthy period of time would require an assessment of the age and condition of the rigging. Quality Services personnel prepared a lessons-learned document on the event indicating that lifting eyes of appropriate material should be installed on any equipment placed in the basin rather than relying on left-in-place slings or chokers. The document also included the following corrective actions.

- Work packages shall include hold points to assess rigging that has been underwater for more than a month before the lifting operation.
- Currently immersed rigging will be inspected monthly using an underwater camera. All slings and tackle will be checked for out-of-date inspections.
- Stainless-steel slings will be used instead of carbon-steel for long-term exposures in the basin. Carbon-steel cables will be lubricated before immersion in the N-Basin.

- Rigging will be inspected when it clears the water, before the load is picked out of the water, to take advantage of the weight displacement before the rigging sees full weight of the load.

NFS has reported events involving dropped loads in several Weekly Summaries. Following are examples of some of the events reported.

- Weekly Summary 97-29 reported that fuel-handling personnel dropped an empty fuel canister approximately 12 feet while moving it into a fuel storage area at the Idaho National Engineering Laboratory. The lifting bail of the canister was not properly engaged with the crane hook. The canister landed vertically and fell to a horizontal position on the floor within a few feet of the fuel storage racks. (ORPS Report ID--LITC-FUELRCTR-1997-0009)
- Weekly Summary 95-34 reported that a weld stand weighing 540 pounds dropped from an overhead crane at the Oak Ridge Y-12 Site when the lifting hardware failed (eyebolts). Investigators determined that the stand was not designed with lifting provisions and the operator-installed eyebolts were not bottomed out. The load was not balanced, and operators performed the lift with the load perpendicular to the eyebolt shank. (ORPS Report ORO--MMES-Y12NUCLEAR-1995-0015)
- Weekly Summary 92-31 reported that a worker was fatally injured at the Oak Ridge K-25 Site when a tie-down strap, which was being used as a lifting strap, failed while lifting a storage tank. (ORPS Report ORO--MMES-K25GENLAN-1992-0094)

These events illustrate the importance of ensuring that rigging is inspected and the load is properly rigged before performing a lift. Dropped loads are extremely hazardous and unacceptable. Riggers should consider the affects on rigging that has been exposed to hazardous environments and adjust inspection frequencies as appropriate. DOE-STD- 1090-96 (rev 1), *Hoisting and Rigging*, provides guidance for hoisting and rigging and identifies related codes, standards, and regulations.

- Chapter 11, "Wire Rope and Slings," recommends a visual inspection of wire-rope slings each day before they are used. Users should note any deterioration that could result in a loss of original strength. A qualified inspector shall perform periodic inspections at least annually.
- Chapter 5, "Hostile Environments," requires preparation of a hostile environment plan to cover operations, equipment, inspection, testing, and maintenance. Rigging shall be qualified before being exposed to a hostile environment.

OSHA 1910.184, *Slings*, states that slings that are defective or damaged shall not be used. Each day before being used, the sling and all fasteners and attachments shall be inspected by a competent person. Additional inspections shall be performed where service conditions warrant.

KEYWORDS: hoisting and rigging, dropped load, pump, inspection, rigging, corrosion

FUNCTIONAL AREAS: Hoisting and Rigging

OEAF FOLLOWUP ACTIVITIES

1. CORRECTION TO WEEKLY SUMMARY 97-34, ARTICLE 2

The last paragraph on page 6 in Weekly Summary 97-34 (Article 2) incorrectly referenced DOE Standard NE F3-45. This standard was superseded by DOE-STD-3020-97, *Specification for HEPA Filters Used by DOE Contractors*, issued in January 1997.

KEYWORDS: unreviewed safety question, HEPA filter

FUNCTIONAL AREAS: Configuration Control, Licensing/Compliance